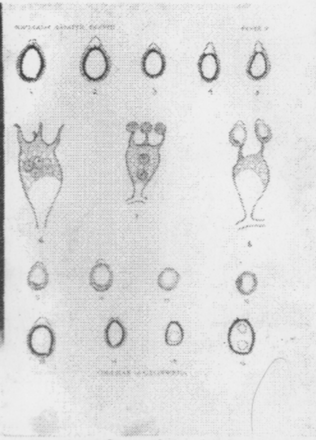
COLEMAN LECTURE - 2014

Dr. Leslie C. Coleman in his laboratory



A page from his publication in 1927 on *Ganoderma*

Colemania sphenarioides – a grasshopper named after him in 1910

Departments of Entomology and Plant Pathology
University of Agricultural Sciences
Bangalore

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Dr. L. C. Coleman: Scientist and Savant

The first decade of 20th century can be identified as a major landmark in the socio-economic development of Karnataka. The decade witnessed several interesting events in quick succession in the then princely State of Mysore – Asia's first hydro-electric power plant at Shivanasamudra across river Cauvery was established near Mysore, the world's longest power transmission line was commissioned in the state, Sir Ronald Ross carried out part of his studies on malaria vectors at Bangalore when in transit to Gudalur and helped design the underground drainage system for the city to tackle the problem of Gastro-enteritis, Kolar Gold Fields and Bangalore became the first cities in the country to get hydro-electric power and the Indian Institute of Science was established at Bangalore based on the recommendation of Nobel laureate Sir William Ramsay. The impact of these events on the position of eminence enjoyed by the State of Karnataka and the city of Bangalore is quite obvious and needs no emphasis.

However, another important event that enabled the State of Karnataka to be what it is today, albeit in a very different domain, also unfolded in the same decade. The rulers of the then princely state, visionaries in real sense, clearly recognized the need for strengthening agriculture - the backbone of our economy. One of the important decisions taken by the state was to bring the benefits of science and technology to agriculture by appointing a Government Chemist Dr. A. Lehmann and the establishment of Department of Agriculture. This was followed by the appointment of Dr. Leslie C. Coleman as the first Government Entomologist and Mycologist in 1908 and with this the education and research in entomology and plant pathology was formally introduced in the State.

Dr. Leslie C. Coleman undertook comprehensive studies on pests and diseases of almost all important crops of the state and devised effective control strategies. In fact his introduction of

Bordeaux mixture to tackle the problem of kole roga (black rot) of arecanut continues to be an effective 'solution' (both metaphorically and practically) for the disease! Several of his studies both as a researcher and as an administrator helped formulate agrarian practices and policies that virtually prepared the State of Mysore for ushering in the 'Green Revolution' in the following decades.

Dr. Coleman was truly a multifaceted personality, his work on many insect pests and plant diseases has stood the test of time and his studies on the sandal spike disease has been rated as one of finest pieces of scientific investigation of plant diseases. His contributions in entomology, cyto-genetics, plant morphology, plant gall formation and even cancer research (post-retirement) truly reflect the wide canvas he painted in his scientific career. Dr. Coleman was way ahead of his times in everything he did; he was instrumental in establishing the Mysore Agricultural and Experimental Union in 1913 and invited farmer members to submit grant proposals for carrying out research – even today this appears a very novel idea. Dr. Coleman was an accomplished scientist, able administrator, policy advisor and above all a well wisher of the farmers of Mysore.

By the time Dr. Leslie C. Coleman remitted office in 1934 he had untiringly served the cause of farmers and agriculture in Mysore for more than 25 years and his stint as the Director of Agriculture, Government of Mysore, for 22 years is perhaps set for posterity! He virtually became a legend in his own life time among farmers of the state of Mysore - his adopted home. It is even said that he would visit villages on official tour and partake of food at farmer's house and even swallow down *ragi mudde*! just to instill confidence in the farmers that he was one of them and had their well-being uppermost in his mind. His single minded devotion to farmers cause earned him the respect of the state's farmers even today many octogenarian farmers remember him and there are farming families in malnad where his photograph adorns the doorway. He was also a household name among the sugarcane farmers of Mandya and a bust of Dr. Coleman can be seen at the Mandya sugar factory.

Working with farmers must have been tough for a foreigner like him especially when the freedom struggle was picking up and citizens generally did not trust the British officials. However, despite the unfavourable conditions he was able to win over the hearts of the farmers – surely he must have possessed great diplomatic and PR skills managing both the farmers and the bureaucracy of his highness the Maharaja of Mysore!

The upwelling of love and affection towards Dr. Coleman when he visited Mysore in 1953 (all the way from Canada at his own expense!) was not surprising at all. Such was his passion for improving the farming sector that he even submitted a 70 page report to the Government of Mysore outlining his impressions on the state of agriculture and possible strategies for improving the lot of farmers. This single act of Dr. Coleman submitting a report on the state's agriculture in personal capacity almost 20 years after he had remitted office speaks volumes of his mission for the farmers he loved and cared for.

Dr. Coleman's achievements are not surprising considering the fact that he was totally devoted to his mission and was by nature a workaholic who woke up at 4.00 am and went to bed not before 1100 pm.

A few achievements of Dr. L. C. Coleman

1. Following his appointment, Dr. Coleman organized the Division of Entomology (study of insects) and Mycology (study of fungi) in the Department of Agriculture in 1908.
2. Establishes several research farms in the then princely state of Mysore-which continue to function even today.
3. Initiated research on pests and diseases of coffee at BR Hills and in Chikmagalur district
4. Trains several Indians in entomology and pathology who later distinguish themselves in agricultural research (Dr. Kunhikannan and, Dr. Subramaniam, to name just a few).

5. Instrumental in establishing the 'Agricultural School' at Hebbal in 1906 and was its first Principal. Incidentally it is this school that has grown in the University of Agricultural Sciences, Bangalore.

6. Initiated research on fungal diseases of arecanut, the major crop of malnad or Western Ghats at Marthur farm near Talguppa.

7. Provided relief to harried farmers suffering losses due to 'kole roga' or 'black rot' by introducing the use of 'Bordeaux mixture' for the first time in the country. This practice is still the mainstay of disease management in arecanut.

8. For the first time in the country 'legal or legislative control' of an insect pest is introduced in the country for coffee stem borer- which required planters to remove infested plants and destroying them by enacting a law!

9. Established a society 'Mysore Agricultural and Experimental Union' in 1913 which even comprised farmer members. So progressive was Dr. Coleman his thinking that he invites proposals from farmers for carrying out research on their farms.

10. Solved the riddle for spike disease of sandal and proves that the disease can be transmitted from tree to tree by an insect vector.

11. Solved the problem of coffee leaf rust which was introduced to India from Sri Lanka.

12. Initiated steps to undertake biological control of insects and even weeds. He is credited with experimenting with using an insect to control the scourge of Lantana weed.

13. The Coffee Experimental Station (Presently Central Coffee Research Institute) was established at Balehonnur in Chikmaglur district under his leadership in 1925.

14. Organized the construction of Sugar Factory in Mandya and even arranged for financial guarantee!

15. He was instrumental in establishing the 'Parasite Breeding Station' for biological control of sugarcane pests.

16. Served as Director of Agriculture, Govt. of Mysore for 22 long years!

17. Several plans, strategies formulated and implemented for improving food production.

18. Submits a comprehensive report on sugarcane and coffee cultivation based on his visits to Fiji and other countries.

19. A multifaceted personality he was also the first person to describe the different forms of ragi with great meticulousness and there was no field he had left untouched from general botany, cytogenetics, entomology, mycology, physiology of plant gall formation, even cancer research (which he undertook after his retirement!).

20. So multifaceted was Dr. Coleman that he had clear prescription on the possible role of engineers in agriculture and had the task cut out for them in soil management.

21. He was perhaps the first scientist in the country to recognize the need for compiling data on agricultural statistics and in 1929 recommended the appointment of a 'mathematician with background in statistics' for all provinces to handle data in a scientific manner! Meticulous to the core, he was obviously keeping track of the phenomenal work in statistical data analysis of field experiments being carried out by R A Fisher at Rothamstead Experimental Station in England.

22. Fellow entomologists have immortalized Dr. Coleman by naming at least eight insects in his honour.

23. Gives a passionate call at the Indian Science Congress (1930) to invest in agricultural research and attract talented scientists

and regrets the outlook of scientific establishment towards the less glamorous field of agricultural research. His words proved prophetic – for without investment in agricultural research that brought in green revolution India could not have become a strong economy that it is today. If an army marches on its stomach – a country that goes hungry can hardly walk leave alone marching!

24. He has left behind a huge body of writings on research and administration the important ones being "The Rice Grasshopper", "The Jola or Deccan Grasshopper", "Hairy Caterpillar (kamblihulas) in Mysore" , "Some Scale Insect Pests of Coffee in South India", "Ground Beetles Attacking Crops in Mysore", together with his "Notes on Sugarcane Cultivation in Java", "Report on the Coffee Berry-Borer in Java", and "Improvement of Coffee in the Dutch East Indies",

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Dr. L. C. COLEMAN, M.A., Ph.D. - AN OBITUARY

Dr. M. Puttarudriah
Head of the Division of Entomology, Mysore State Department of Agriculture

AGRICULTURISTS in general and entomologists in particular in India were grieved to hear the sad news of the demise, of Dr. Leslie C. Coleman (May Peace be on his soul!) by an accident in his native country on 14th. September 1954. Dr. Coleman was one of the pioneers in the field of Agricultural Entomology in India. Having started his career as Entomologist and Mycologist to the Government of Mysore in 1908, he made many outstanding contributions on our major crop pests. He built up the Division of Entomology on a sound basis and for the .first time, worked out the biology and control measures of serious pests like the paddy and jola grasshoppers, hairy caterpillars green bug on coffee and many other pests. A great collection of pests was built up and intensive research was undertaken. Many insects were described for the first time and many were named after him.

He has been immortalised more than once, as several insects named after him bear witness. An entire genus was erected as *Colemania* Bolivar with the species *sphenarioides* Bolivar as this serious pest of jowar called the Deccan Grasshopper was discovered and worked out in the northern districts of Mysore by him.

Apart from his contributions to the study of the paddy grasshopper, another new species of grasshopper found in paddy fields has been named after him as *Hieroceryx colemani* Bolivar.

His name has been a household word among coffee planters. He has saved their coffee industry from the ravages of not only Koleroga but also of green bug which again was worked out by him and so was named after him as *Coccus* (*-Lecanium*) *viridis colemani* Kannan.

Even in the early days of his entomological career, he realised the importance of the beneficial natural agency in keeping the pest below economic level. He noted many hymenopterous parasites on crop pests and as many as six of them have been named after him: Aphidius colemani Viereck, *Apanteles colemani* Viereck, *Anastatus colemani* Crawford, *Bruchobius (Sphaerakis)* colemani Crawford, *Tetrastichus colemani* Crawford and *Telenomus colemani* Crawford.

During 1921 and 1933, he tried to introduce the lantana Agromyzid flies from Hawaii for the biological control of the introduced weed *Lantana camara* which has become a serious 'scourge in this country .

His contribution, in other fields of agriculture have been many and in" the field, of .entomology his works on "The Rice Grasshopper", "The Jola or Deccan Grasshopper", "Hairy Caterpillar (kamblihulas) in Mysore" , "Some Scale Insect Pests of Coffee in South India", “Ground Beetles Attacking Crops in Mysore", together with his "Notes on Sugarcane Cultivation in Java", "Report on the Coffee Berry-Borer in Java", and "Improvement of Coffee in the Dutch East Indies", etc,. etc., have been outstanding.

In a small space, it is "very difficult to express adequately the unforgettable contributions to the cause of the Mysore farmer and the small homage that a student of entomology can pay to the memory of the great scientist is to state that the foundation he laid in the Division of Entomology is secure and strong and the work that he did will sustain his successors to build up the fortress of teaching, research and plant protection that he aimed at. In fact, it is gratifying to state here that when he visited this country during 1953-54, he expressed his great satisfaction about this Division and hoped that he would come again after another interval to review the work here and note his satisfaction; but God willed it otherwise.

Dr. L. C. Coleman is a name which inspires all entomological workers and we in this Division hope to continue the work for the cause of cultivators he stood for.

Synopsis of the Coleman Lecture 1014

INSECT PHYSIOLOGY RESEARCH IN INDIA : PERSPECTIVES AND FUTURE DIMENSIONS

B. Subrahmanyam
Principal Scientist (Entomology) (Retd.), IARI, New Delhi

Entomology has been a science of fascinating pursuit of insects, which are important not only for the damage they cause to the cultivated crops and domestic animals, but also for the benefits we derive, which are vastly under rated. While there are multitude of reasons for the dominance and success of insects, the prime reasons have been their unique physiological mechanisms and adaptations besides their small size. Insect physiology has been a subject of research and teaching in many developed countries since the beginning of the twentieth century. Prominent among the pioneers are Stefan Kopec, Sir Wigglesworth, Nobel laureates Adolf Butenandt and Karl von Frisch, Caroll Williams, Kenneth Roeder, V G Dethier, G Fraenkel, H E Hinton, Edward Steinhaus, Morris Rockstein and many others. While the boundaries of any subject are much diffused, interdisciplinary approach to insect physiology research came in a big way 1950 onwards. These efforts are reflected in astounding advances made by L I Gilbert, K. Slama, Peter Karlson, Ashburner, Engelmann, L Riddiford, R Brown, Ashok Raina, M Berenbaum, T A Miller and many others in diverse fields of research.

Though insect physiology research in India has not run parallel to that in advanced nations, beginnings were made at I A R I following the arrival of Prof. N C Pant from UK and Prof. K N Mehrotra from USA who specialized in insect nutrition and insecticide action and metabolism, respectively. Research as well as post graduate teaching in insect physiology has been running parallel in IARI since 1966. The summer school lectures entitled "Insect anatomy and physiology" (1972) has received the widest circulation in India. It dealt with basic aspects of almost all the present day research topics in insect physiology. In a short span of 10 years, young doctorates from this parent institution have initiated teaching and research in several educational institutions in India. Delhi University, BHU, GBPUAT and several other universities have also worked on problems in insect physiology. National level funding for research in insect physiology came up only since 1986 following the initiatives by Department of Science and Technology and the Department of Biotechnology. Research projects on areas such as "Non-conventional insecticides, Natural products in pest management, Bt. Research, Insect viruses in IPM etc" received financial support. Support from the ICAR came under the AP Cess fund projects, National Fellow and Professor Eminence Projects, NATP and more recently NAIP Projects. Such projects have encouraged the flow of cross currents of ideas from specialists in agricultural chemistry, genetics, molecular biology and biochemistry into insect physiology research. Inter-institutional /disciplinary collaboration has been identified as absolutely necessary.

Rapid advances have been made in understanding the action of azadirachtin from neem, identification of several new naturally occurring insecticidal / growth regulatory compounds including the protease inhibitors etc. The role of IICT in promoting insect pheromone research, CICR in monitoring insecticide resistance as well as developing Bt transgenic cottons and I A R I in generating base line susceptibility data on Bt isolates and evaluating the potential of insect viruses in IPM is remarkable. Institutions under Central Silk Board especially CSRTI, Mysore; SSTL, Bangalore and CTRTI Ranchi have progressed well in understanding silkworm nutrition in relation to host crop physiology, races in relation to silk yield and quality, monitoring and management of diseases, diapause physiology, etc. and a biotechnology unit - Seri-biotech at Bangalore.

While these efforts have led to note-worthy contributions nation-wide, we have to make a few giant steps forward. It is time to initiate long-term research projects in physiology in place of 3-5 year projects wherein national level priorities have to be drawn to meet the demands in basic, agriculture and human health related research. Emphasis on eco-physiology of crop pests as well as disease vectors in relation to climate change is of utmost importance. These can be achieved through inter-disciplinary and inter institutional cooperation. The man power in entomology which at present is mainly trained in conducting field level research has to be motivated to take up challenging areas in insect physiology. They also need to be exposed to theory and practice of molecular biology and biotechnology as well as to the chemistry of secondary plant substances that contribute to plant defense. Reduced insecticide load on crops, soil and environment and success of *Bt* transgenic cottons in the last 15 years adequately justify special emphasis on insect physiology teaching and research nation-wide.

Career profile of Dr. B. Subrahmanyam

Education

B. Sc. (Ag.) from Agricultural College, Bapatla of AP Agricultural University (1964-68) and M. Sc (Ag) Entomology from the College of Agriculture, Rajendranagar (APAU) (1968-70).

Obtained Ph.D. from IARI New Delhi (1974-78) for a thesis on Nuclear Polyhedrosis virus of *Spodoptera litura*. Research Guide was Professor N Ramakrishnan.

Employment

Initially had a brief stint of working as a research assistant in Rockefeller Foundation, Hyderabad and as teaching assistant at APAU (1971-73).

Joined the Division of Entomology as Scientist in 1977 following selection in the first batch of Agricultural Research Service of the ICAR.

Continuously worked at IARI, New Delhi and retired as Principal Scientist in August 2010.

Post-Doctoral Research

Fellow (1986-1988) at the Max-Planck Institute for Biochemistry, Munich, Germany and worked with Professor Heinz Rembold on "insect endocrines and action of azadirachtin".

FAO visiting scientist under the AHRD project for 3 months in the year 2000 and worked at the University of North Carolina (Chapel Hill) USA with Professor L I Gilbert on ecdysone biosynthesis.

Research Projects

Completed research projects on "natural products, accessory glands of insects and whitefly biotypes" and associated as collaborator on "nano-pesticides and entomopathogenic nematodes".

Publications

Published over 60 research papers including 20 in international journals.

Teaching

Simultaneously taught three courses in Insect Physiology for two decades since 1989 at the Post-Graduate School IARI.

Guidance

Guided 7 students for Ph. D. of whom two have settled in research careers in USA.

Awards

Received two awards - Best Teacher award of IARI in 1999 and "Outstanding Teacher Award" of ICAR for the biennium 2002-2003, instituted after Bharat Ratna Dr. C Subramanyam.

Edited a book entitled "Frontier Areas of Entomological Research" based on invited papers of a national symposium held in 2003.

QRT Member of Indian Institute of Natural Resins and Gums, Ranchi (2012).

Worked as a referee for several journals in Entomology and allied subjects.